the processes besides the different alpha-olefin was that in this process, the mixture of sulfur trioxide and air was passed into the reactor at the rate, on a sulfur trioxide basis, of 0.23 pound per minute. This represented a molar ratio of sulfur trioxide to olefin of about 1.05:1. The product distribution obtained was about as follows: 46% sodium tridecene-1-sulfonate; 20% sodium 2-methoxy tridecane-1-sulfonate; 17% sodium 3- and 4-hydroxy tridecane-1-sulfonate; 14% sodium tridecene disulfonate; and the balance comprising sodium sulfate and sodium methyl sulfate.

Example VIII

A process similar to the process of Example I is run with the exception that a 1:1 mole ratio of sulfur trioxide to olefin is reacted at a temperature of about 50° F. Pressure at the top and bottom of the film reactor is about 14 p.s.i.g. and 9 p.s.i.g., respectively. 91% of the olefin is sulfonated. The resultant composition contains the following components and percentages: 48% sodium hexadecene-1-sulfonate, 36% sodium 2-methoxy hexadecane-1-sulfonate, 12% sodium 3- and 4-hydroxy hexadecane-1-sulfonate, and 4% sodium hexadecene disulfonate.

Example IX

Example I is again substantially repeated. This time a 1:1 mole ratio of sulfur trioxide to olefin is reacted at 100° F. for 35 seconds. 97% of the olefin is sulfonated. The final composition contains the following percentages of components: 46% sodium hexadecene-1-sulfonate, 34% sodium 2-methoxy hexadecane-1-sulfonate, 14% sodium 3- and 4-hydroxy hexadecane-1-sulfonate, 4% sodium hexadecene disulfonate and the balance sodium sulfate and sodium methyl sulfate.

Example X

When Example I is repeated using ethanol, n-propanol, isopropanol, n-butanol or isobutanol in place of the methanol on the same molar basis, substantially the same product distribution of sodium hexadecene-1-sulfonate, sodium 2-alkoxy hexadecane-1-sulfonate, sodium 3- and 4-hydroxy hexadecane-1-sulfonate and sodium hexadecene disulfonate is obtained.

The reaction products obtained according to the processes described and exemplified above are very useful as detergent compositions. They can be formulated readily into unbuilt, light-built, medium-built, and heavy-built detergent compositions. As used herein, built detergent formulations refers to those compositions containing a detergent and any of the many known builder compounds. Such builder compounds can be water-soluble inorganic alkaline builder salt, water-soluble organic alkaline builder salts, or mixtures thereof.

The lightly- and medium-built compositions are especially useful in dishwashing formulations and other compositions prepared specifically for hand laundering delicate fabrics such as silks, cottons, woolens, and others as well as synthetic textile materials such as nylon or the like.

The heavily-built formulations are especially useful for laundering heavily soiled fabrics. The built compositions discussed above can take the form of liquid compositions embodying also an aqueous vehicle, or solid compositions such as spray-dried granules, powders, flakes, and tablets.

What is claimed is:

1. A process for preparing a water-soluble sulfonated reaction product, comprising the steps of:

(a) reacting an alpha-olefin containing from 10 to 20 carbon atoms with sulfur trioxide in a film reactor at a temperature of from 32° F. to 180° F., a pressure at the top of reactor of from 8 p.s.i.g. to 20 p.s.i.g., a reaction time of from 12 seconds to 50 seconds and wherein from 1.0 mole to 1.25 moles of the sulfur trioxide is reacted with each mole of the alpha-olefin to produce a sulfonated mix;

(b) reacting about within 5 seconds the sulfonated mix of step (a) with a lower alcohol having from 1 to 4 carbon atoms;

(c) neutralizing the product of step (b) with an alkali solution; and

(d) hydrolyzing the product of step (c) to obtain the water-soluble sulfonated reaction product comprising the water-soluble salts of from 40% to 55% alkene-1-sulfonate, from 20% to 40% of 2-alkoxy alkane-1-sulfonate wherein the alkoxy radical contains from 1 to 4 carbon atoms, from 10% to 20% of 3- and 4-hydroxy alkane-1-sulfonate, and from 2% to 15% of alkene disulfonates, wherein the sulfonated chains all have from 10 to 20 carbon atoms.

2. The process of claim **1** wherein the sulfur trioxide is mixed with an inert gas in a volumetric ratio of inert gas to sulfur trioxide of from 10:1 to 100:1.

3. The process of claim **2** wherein the sulfur trioxide is uncomplexed.

4. The process of claim **2** wherein from 0.3 pound to 0.7 pound of sulfur trioxide is added for each pound of alpha-olefin per minute.

5. The process of claim **4** wherein the sulfonated mix of step (a) is reacted with the alcohol for from 5 minutes to 60 minutes at from 32° F. to 150° F.

6. The process of claim **5** wherein from 1.5 moles to 20 moles of alcohol is reacted with each mole of the sulfonated mix of step (a).

7. The process of claim **6** wherein the product of step (c) is hydrolyzed at a temperature of from 70° F. to 350° F. and a pressure of from atmospheric pressure to 120 p.s.i.g. for from 15 minutes to 72 hours.

8. The process of claim **7** wherein the alpha-olefin contains from 14 to 18 carbon atoms.

9. The process of claim **8** wherein the sulfonated mix of step (a) is reacted with a methyl alcohol or ethyl alcohol.

10. The process of claim **9** wherein from 1.1 to 1.2 moles of uncomplexed sulfur trioxide is reacted with each mole of the alpha-olefin.

11. The process of claim **10** wherein the sulfonation reaction of step (a) is carried out at a temperature of from 45° F. to 100° F. for from 15 seconds to 30 seconds.

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